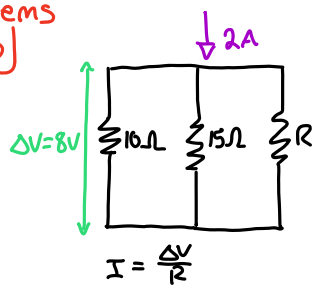
Taylor Larrechea
Dr. Middleton PHYS 132 HW
3-7-17

Ch 31.
CQ 10.
P. 20, 22, 46

Problems

31. P. 20



$I = \frac{\Delta V}{R}$

$I_{in} = I_{out}$

I_1: $\Delta V = 8V$, $R_1 = 10\Omega$, $I_1 = 0.8A$

I_2: $\Delta V = 8V$, $R = 15\Omega$, $I_2 = 0.53A$

I_3: ? $R = \frac{\Delta V}{I_3}$, $\Delta V = 8V$, $I_3 = 0.67A$, $R \approx 12\Omega$

$R_3 = 12\Omega$

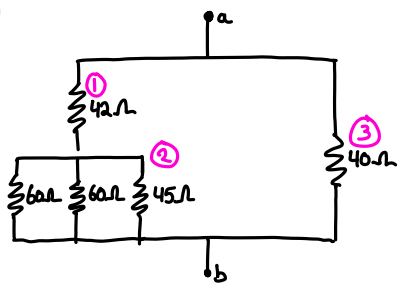
2A in = 2A out

$I_1 + I_2 + I_3 = I_T$

$I_3 = 2A - 0.8A - 0.53A$

$I_3 = 0.67A$

31. P. 22



Parallel: Add like capacitors in series

Series: Add like capacitors in parallel

2: $\frac{1}{R_{eq}} = \left(\frac{1}{60\Omega} + \frac{1}{60\Omega} + \frac{1}{45\Omega}\right)$

$R_{eq} = 18\Omega$

$R_A = R_1 + R_2$: $42\Omega + 18\Omega = 60\Omega$

$R_A + R_3$: $\frac{1}{R_{eq}} = \left(\frac{1}{60\Omega} + \frac{1}{40\Omega}\right)$

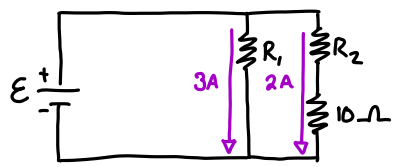
$R_{eq} = 24\Omega$

24Ω

Between A & B

$R = 24\Omega$

31. P. 46



$\mathcal{E} = IR$

$I_2 = 2A$

$I_1 = 3A$

$\Delta V = \mathcal{E} = \frac{2A(10\Omega)}{(1 - \frac{2A}{3A})} = \frac{20A\Omega}{\frac{1}{3}}$

$\mathcal{E} = 60V$

$\mathcal{E} = 60V$

1: $I = \frac{\Delta V}{R}$, $\Delta V = \mathcal{E}$, $R = \frac{\Delta V}{I_1}$, $I_1 = 3A$

2: $R_{eq} = 10\Omega + R$, $\Delta V = IR_{eq}$

$\frac{\Delta V}{I_2} = 10\Omega + \frac{\Delta V}{I_1}$

$\Delta V = I_2(10\Omega + \frac{\Delta V}{I_1})$

$\Delta V = I_2 10\Omega + \frac{I_2 \Delta V}{I_1}$

$\Delta V - \frac{I_2 \Delta V}{I_1} = I_2 10\Omega$

$\Delta V(1 - \frac{I_2}{I_1}) = I_2 10\Omega$

$\Delta V = \frac{I_2 10\Omega}{(1 - \frac{I_2}{I_1})}$

Conceptual

31. C. 10

a.) Since B & C have the same resistance and current, their scenario is equivalent to each other

A > B = C

b.) When a wire is added between 1 & 2, the current through B & C disappears due to the wire having no resistance. Current flow B and C is zero. This then means the resistance is smaller and thus A would be brighter.

B & C go out
A Brightens

$I = \frac{\Delta V}{R}$: $\Delta V = IR$

$R_{BC} < R_A$